3-D Engineering Corp.

Professional Engineering Services:

Technology Development, Research & Development,
CAD Design , Manufacturing, Assembly,
Test & Integration

Woman Owned Small Business (WOSB)

Linda S. Luoma
President
3-D Engineering Corporation

Susan E. Boone
Vice President Business Development
3-D Engineering Corporation

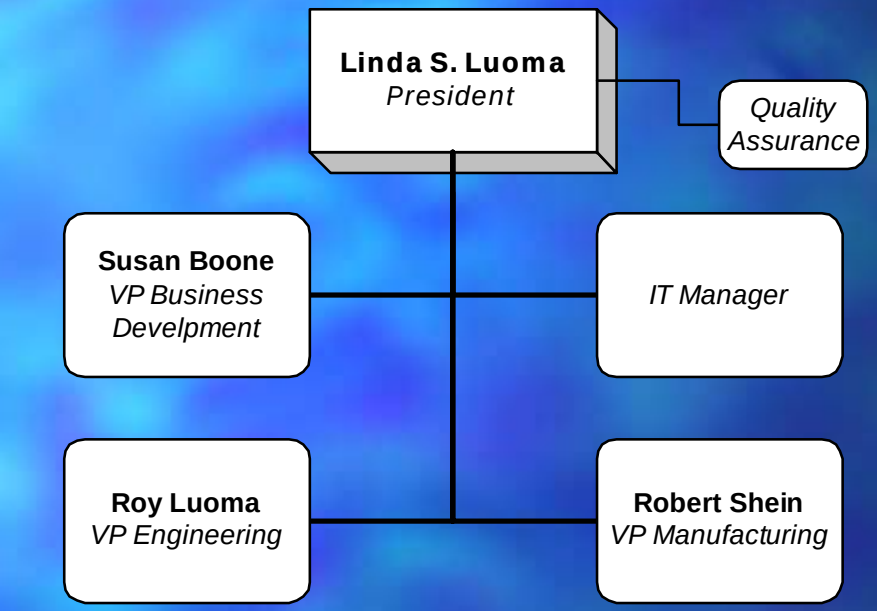
Roy S. Luoma
Vice President Engineering
3-D Engineering Corporation

Robert Shein
Vice President Manufacturing
3-D Engineering Corporation

Company Introduction

- 3-D Engineering Corp. was formed in July 1998
- Provides world class research & design development services ranging from requirements definition through system deployment
- Process driven organization with highly automated data management systems
- Provides services on-site or from our location in Temecula, California
- Collaborate with our customers to provide a near seamless research & design development capability and systems engineering approach

3-D Organization



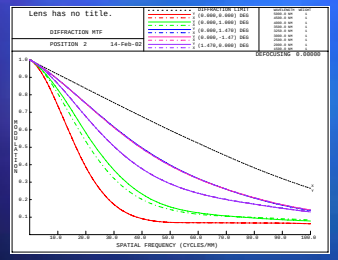
- Project Engineer, R& D
- Product Design Engineer
- R&D Physicist
- Software Engineer
- Lead Mechanical Designer
- Electrical Engineer

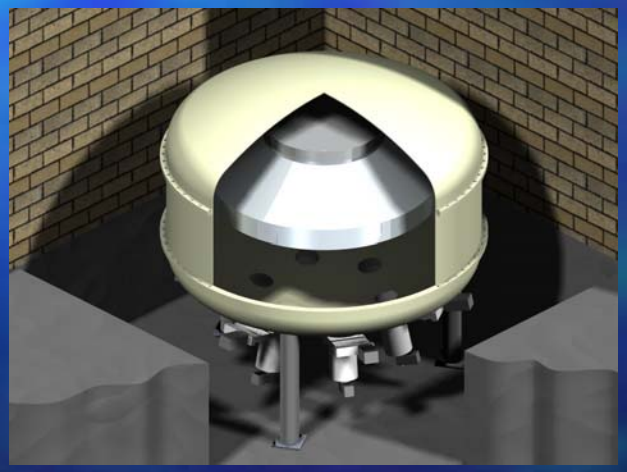
- Manufacturing Engineer
- Industrial Engineer
- Technicians

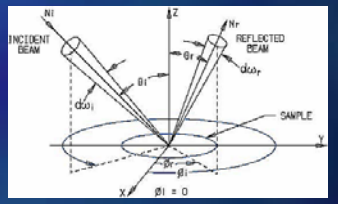
3-D Engineering maintains agreements with associates to supplement our core capabilities

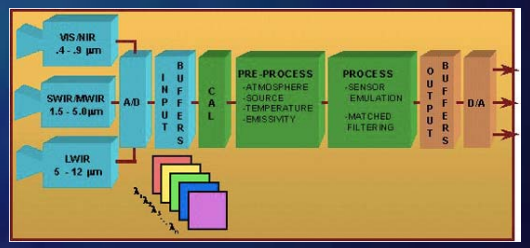
Capabilities Overview

- Research And Development
- Mechanical, Electrical, & Software Engineering Design
- Engineering Analysis
- Configuration Management
- Test, Evaluation & Integration
- Manufacturing (Including Prototype & Small Run Production)









Research and Development

- Provide Efficient and Highly Consistent Research & Development Employing Proven Processes, Technologies, and Experienced Engineers.
  - Conducted Technology Assessments and Feasibility Studies For Resolving "Best Method" Or "Best Approach" for Developing New Technology .
  - Development Of Working Hardware (Brass boards) To Demonstrate Performance Of Selected Technical Approach.
  - Perform Test and Evaluation for design principles and critical operating parameters.
  - Generation of Specification Control Documents (SCD) for System and Module Level Requirements.
  - Development Of Prototype "Technology Demonstrators" for field tests.
  - Development Of Systems for Pilot Production.
  - Design Refinement and Documentation Tasking for FSD (i.e., Production Drawings, Test Reports, CDRL's, SCD updates)

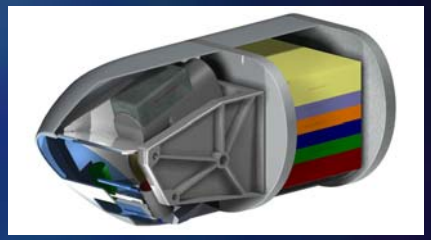
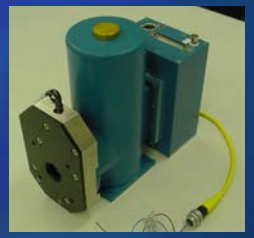
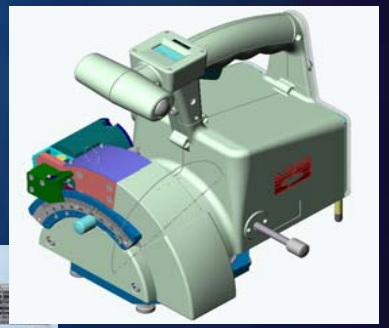




R&D Project Examples

- Research and Development employs concept development tools and related resources, In-house laboratory area for prototype development, test, evaluation, and data acquisition systems as well as outside resources for specialized processes.
- Examples:
  - System and Subsystem Requirements Definition and Mechanical Design of the Sensor Suite of the Affordable Weapon Technology Demonstrator. ***(International Systems)***
  - Cryogenically Cooled Optical Systems for a High Resolution and High Dynamic Response, Real-Time Hyper spectral Imaging Systems for Remote Sensing Applications. ***(Navy-Crane)***
  - Developed the Infrared Camera Cold Shutter (IRCCS) for SBFP camera system (Patent Pending). ***(Navy-Crane)***
  - Developed a Hand Held In-Situ Bi-directional Reflectometer to measure BRDF of surface properties in the field for BDA and repair. ***(Air Force/ Boeing)***
  - Electronic Packaging of CPCI Systems for Ruggedized and Office Environments. ***(Military & Multiple Commercial)***
  - Developed Highly Reliable "5-Axis" Magnetic Bearing System for use in Argon-Neon-Fluorine Environment. ***(Cymer)***



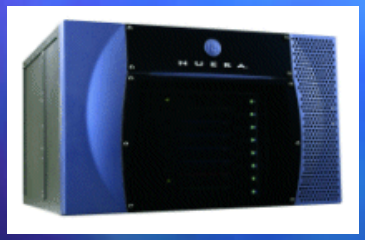

R&D Project Examples (cont)

- Tomahawk cruise missile (FCR & Radome)
- Advanced Cruise Missile (ACM) (Nose Cone and Inertial Guidance system)
- Ground Based and Hand Held Mine Detection (system design)
- F-16 Lightweight Electromagnetic Structure (LES)
- A-12
- RAH-66 Comanche (displays program- design development)
- 6522 (Classified)
- Low A/e coatings (space based Cassegrain antennas)
- Structured Surfaces
- FSS
- Lightweight Computer (ruggedized)
- MISTI-3 Dual Band Imaging Satellite

Mechanical, Electrical, & Software Engineering Design

- Design requirements review
- Feasibility Study, Concept Development, 0^{th} order analyses
- Electrical, Mechanical, & Software design requirements flow down.
- Preliminary design analysis
- Design review and refinement
- Detail design & analysis
- Prototype fabrication
- Documentation update & Configuration Management
- Pilot production

Design Development Examples



- Designed and developed the hand-held directional reflectometer (HHDR). *The device reduces the time to acquire the BRDF from days to minutes.*
- Electronic packaging of compact PCI format electronic modules. *Designed to dissipate 1500 watts of power and meet the NEBS level 4 requirements*.
- The XLA 100 is Cymer's new ultra line-narrowed, high power argon fluoride (arf) production light source for next generation lithography tools. *The optics modules required an ultra pure operating environment to achieve lifetime requirements. 3-D engineering is responsible for the development and design of 1/3 of the modules that make up this state-of-the-art laser system.*

Engineering Analysis & Examples

File

- Conducted numerous transient and steady state thermal analysis for component and system level performance characterization. *(Examples include: warm-up prediction for the Comanche displays from artic cold, electronic packaging of various formats, cryogenic applications)*

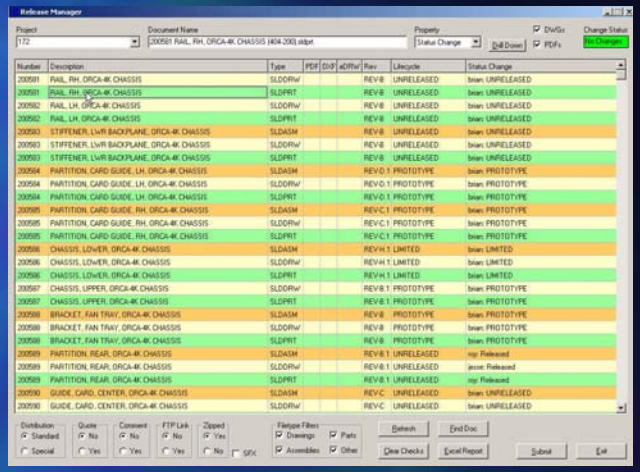
- Conducted structural analysis to determine modal & random vibration characteristics for airborne and ground vehicles. *(Examples include: MISTI-3 dual band imaging satellite, flat panel displays for the **Comanche** helicopter program, a tethered aerostat for remote sensing application, vehicle-based mine detection systems, antenna systems for ship board & ground stations)*

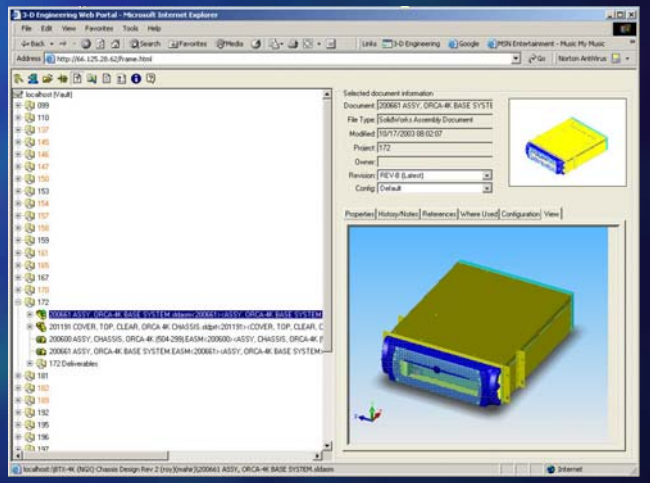
MSTI-3 incorporated several system upgrades to support a more complex remote sensing payload, including one of the first hyperspectral imager instruments ever flown in space. Launched in May 1996 on a Pegasus rocket, the spacecraft collected over 3 million SWIR and MWIR images as well as hyperspectral images. MSTI-3 exceeded its design lifetime by over 50% before being de-orbited in December 1997.

- Analysis for compliance with NEBS requirements for radiated & conducted emissions and fire safety.

Configuration Management

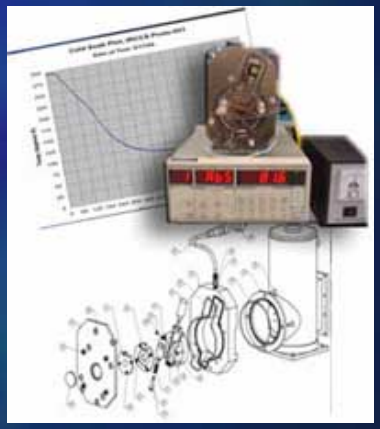
- 3-D employs proven processes and proprietary workflow automation software to streamline the configuration management requirements for a project.
- Our product development process (PDP) requires data item travelers (DIT) for tracking the progress of development during the process.
- All of our data items (models, drawings, specs, OTS, COTS, schematics, board layouts, components libraries) are version controlled in the “as built” or “latest rev” configuration.
- Our “advanced server” system provides secure access to our electronic vault (24/7) via your web browser if the customer so desires.
- Our release manager system performs auto routing of documents (via e-mail) for design approval & review.
- ***Our systems provide the flexibility to conduct development efforts unilaterally as well as a reliable and efficient process to collaborate with our customers regardless of their location or time zone.***





Test & Evaluation

- Environmental Stress Screening (ESS)
- Airflow testing
- Vibration & Shock
- Temperature
- Humidity
- EMI/RFI
- Resonant Search
- NEBS Testing (Bellcore GR-63)
  - (thermal, earthquake, fire, safety, transportation and storage, operating and non operating, altitude, heat dissipation, Package shock, corrosion)



Manufacturing Experience

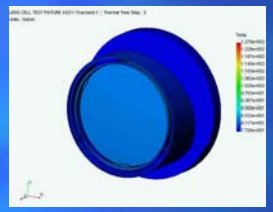
- Optical systems and devices (Navy-Crane, Cymer, Intralase, AFML)
- Cryogenic design for cooled optical systems (Navy-Crane)
- Laser systems and devices (International Systems, Calhoun, Cymer)
- Sensors and laboratory automation (SAIC)
- Production automation systems (Medical & Commercial)
- Ruggedized electronic chassis and aesthetic panel assemblies (Nuera Calhoun)
- Kinematics and special purpose mechanisms (Intralase)
- Electronic test equipment (Military & Compact PCI customers)

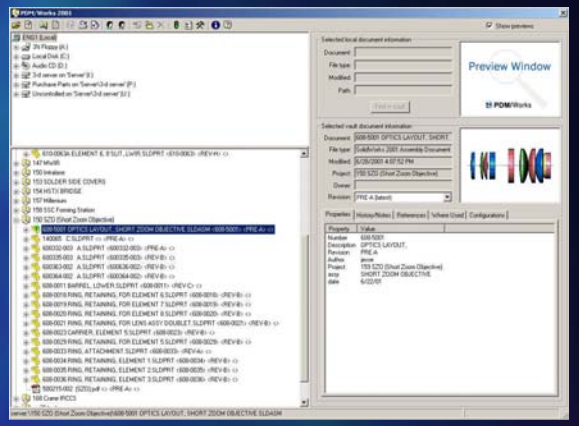
Facilities

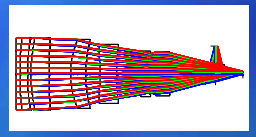
- 8000 sq ft. facility located in Temecula California.
- 1500 sq. ft. devoted to development laboratory and pilot production assembly.
- 3500 sq. ft. devoted to office.
- 3000 sq. ft. Manufacturing
- Inventory Control - receiving through finished goods.

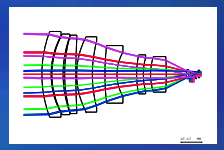
Development Tools

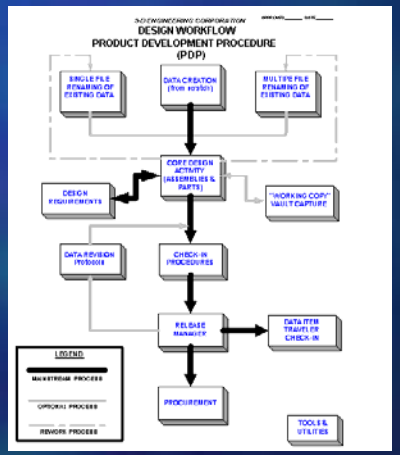
- Mechanical Design and Analysis
  - SolidWorks (4) + Add-ins
  - Wildfire
  - CosmosWorks, Stress and Thermal
  - Rapid Prototype Capability
- Electrical Design and Analysis
  - Orcad Schematic Capture
  - Orcad Layout
  - ICAP/4 Simulation Software (SPICE)
- Optical Design and Analysis
  - Optis Works
  - Code V
  - Zemax
- Documentation Control and Collaboration
  - PDMWorks (Electronic Data Versioning Vault)
  - Pro-Intralink
  - Advanced Server (Provides Secure Access 24/7)
  - Release Manager
  - Customized workflow automation with automated notification and documentation











SolidWorks Manufacturing Network Partner

Expertise We Offer

- Affordable Weapon (subsystems, avionics)
- Ruggedized electronics / packaging
- Remote sensing systems (Homeland defense)
- Handheld cryogenic systems
- Test, Evaluation and Integration
- System Engineering
- Compact PCI Requirements

Contact Information

Ms. Linda Luoma

President

(951)296-3060 X204
lluoma@3deng.com

42132 Remington Avenue

Temecula, CA 92590

Tel: (951) 296-3060
Fax: (951) 296-5675